

## CLAIMS

What is claimed is:

1. A source structure for a local interconnect, comprising:  
a semiconductor substrate;  
a nitrogen-rich Ti layer having a nitrogen-rich upper portion and a titanium lower portion,  
wherein the nitrogen-rich upper portion is not pure titanium nitride, the titanium lower  
portion is substantially nitrogen-free, and the nitrogen-rich Ti layer overlies a portion of  
the semiconductor substrate;  
a refractory metal layer overlying the nitrogen-rich Ti layer; and  
a silicon layer overlying the refractory metal layer.
2. The structure of claim 1, wherein the semiconductor substrate is a silicon  
substrate.
3. The structure of claim 2, wherein the nitrogen-rich Ti layer is disposed over active  
areas in the silicon substrate.
4. The structure of claim 1, wherein the nitrogen-rich upper portion extends along an  
upper surface of the nitrogen-rich Ti layer.
5. The structure of claim 1, wherein a lower portion of the Ti layer contains  
substantially no nitrogen.
6. The structure of claim 1, wherein a thickness of the nitrogen-rich upper portion  
ranges from about 50Å to about 100Å.
7. The structure of claim 1, wherein a thickness of the nitrogen-rich Ti layer ranges  
from about 100Å to about 300Å.

8. The structure of claim 1, wherein the refractory metal layer comprises Co or Ti.
9. The structure of claim 8, wherein the refractory metal layer comprises Ti.
10. The structure of claim 1, wherein a thickness of the refractory metal layer ranges from about 100Å to about 300Å.
11. The structure of claim 1, wherein a thickness of the silicon layer ranges from about 400Å to about 1000Å.
12. A local interconnect structure, comprising:  
a semiconductor substrate;  
a titanium silicide layer disposed over a portion of the substrate;  
a nitrogen-rich Ti layer disposed over the titanium silicide layer; and  
a refractory-metal silicide layer disposed on the nitrogen-rich Ti layer.
13. The structure of claim 12, wherein the semiconductor substrate is a silicon substrate.
14. The structure of claim 13, wherein the titanium silicide layer is disposed over active areas in the silicon substrate.
15. The structure of claim 12, wherein a thickness of the nitrogen-rich Ti layer ranges from about 50Å to about 100Å.
16. The structure of claim 12, wherein a concentration of nitrogen in the nitrogen-rich Ti layer ranges from about 2% to about 15%.

17. The structure of claim 12, wherein the refractory-metal silicide layer comprises Co or Ti.

18. The structure of claim 17, wherein the refractory-metal silicide layer comprises Ti.

19. The structure of claim 12, wherein a thickness of the refractory-metal silicide layer ranges from about 300Å to about 1000Å.

20. The structure of claim 12, wherein the nitrogen-rich Ti layer comprises a nitrogen-rich upper portion and a titanium lower portion, wherein the nitrogen-rich upper portion is not pure titanium nitride and the titanium lower portion is substantially nitrogen-free.

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